

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment filed on 20 June 2007 does not place the application in condition for allowance.

### ***Status of Rejections Pending Since the Office Action of 20 March 2007***

2. All rejections of claim 16 are obviated due to cancellation of the claim.
3. The rejection of claims 2-7 and 21-29 as unpatentable over JP '031 in view of Fleming et al is maintained.
4. All other previous rejections are withdrawn due to Applicant's amendment.

### ***Election/Restrictions***

5. Newly submitted claims 40 and 41 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Claim 40 is drawn to a structure for responding to incoming radiation, which is a subcombination of the combination claimed in claims 1 and 17. The claims are distinct because the combination does not require the particulars of the subcombination (i.e. a computer-generated element), and the subcombination has different utility, such as in an element in which the first order diffraction is not substantially eliminated.

Claim 41 is drawn to a solar cell module, which is a subcombination of the combination claimed in claim 17. The claims are distinct because the combination does not require the particulars of the subcombination (i.e. a computer-generated element),

and the subcombination has different utility, such as in an element in which the first order diffraction is not substantially eliminated. Claim 41 is also a combination with the subcombination claimed in claim 1. The combination of claim 41 does not require the particulars of the subcombination (i.e. substantial elimination of first order diffraction), while the subcombination has separate utility, such as in solar modules having non-computer generated diffraction optics.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 40 and 41 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Comments on Terminology and the Declaration of Bernhard Piwczyk***

6. Regarding the remarks given in the 4th paragraph of page 10 of the response filed on 20 June 2007 (i.e. paragraph beginning with "It is important to note . . ."), the Examiner cannot accept Applicant's position. The terms "first order" and "zero order" or "zeroth order" have very definitely established and understood meanings within the optical arts, and these terms are not subject to redefinition. While it is unclear what precisely is meant by the "strongest, central diffraction", it appears that Applicant may be referring to specular reflection. Note section 2.1 of the enclosed "Diffraction Grating Handbook" reference. It follows from equation 2.1 that specular reflection corresponds to the zero order diffraction (i.e.  $m=0$ ; Page 20, lines 5-6). This is the understood

meaning of "zero order" in the art, and this is the meaning it will be given in the examination of this application. Likewise, "first order" diffraction is understood within the art to correspond to the diffracted light satisfying equation 2.1 with  $m=1$ . This is the meaning that will be given to "first order" in the examination of this application.

The declaration of Bernhard Piwczyk apparently also reflects this conflict of terminology, as paragraphs 7-10 of the declaration speak of elimination or suppression of zeroth order diffraction, while the specification discloses only elimination or suppression of first order diffraction. This appears to be a significant defect in the originally-filed specification, and if Applicant desires to claim suppression of zero order diffraction, it is strongly suggested that a continuation-in-part using the proper terminology be filed.

Since the original specification of the instant application included no redefinition of the term "first order", the claim term must be given its conventional, accepted meaning in the art. Applicant's declaration is not persuasive, since it does not address the claimed elimination of first order diffraction.

### ***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-15 and 17-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject

matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support for the limitation that "one or more diffraction orders are substantially reduced or suppressed". Within the original disclosure, there is only support for reduction or suppression of first order diffraction. There is no disclosure of suppression of any "more" orders.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-15 and 17-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "first order" in claims 1 and 17 is used by the claim to mean what is accepted in the art as meaning "zero order". Note the declaration of Bernhard Piwczyk and the 4th paragraph of Page 10 of the response of 20 June 2007. The term is indefinite because the specification does not clearly redefine the term.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 1-10, 13, 15, 17-33, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-266031 in view of Fleming et al. (Blazed diffractive optics, Applied Optics, Vol. 36, No. 20, 1997, pgs 4635-4643)

Regarding claims 1 and 17, JP '031 shows a solar cell module having a support structure (28) having a planar surface (Figure 20c; it is planar beneath cells 6); a plurality of solar cells (6) overlying the planar surface having front and back surfaces as claimed; a transparent cover member overlying and spaced from the solar cells (e.g. cover shown in Figures 1 and 16); a diffractive optical member as claimed (Figure 20a-c; member 34); wherein the diffractive optical member comprises a substrate having a diffractive surface (Figure 16b; layer 18), a coating layer disposed over the diffractive surface having a refractive index different than the substrate (17); the diffractive surface comprising a relief pattern selected to provide second order diffracted light (Paragraph 0050); the diffractive surface having a pattern to diffract incident radiation in at least two directions as claimed (see figure 1).

Regarding claims 8, 9, and 30-32, JP '031 discloses the substrate is a plastic film and the coating layer is aluminum (paragraph 0039, English translation).

Regarding claims 10, 13, and 33, figure 16 shows an insulation layer, 19, over the coating layer that is plastic, a polymer (paragraph 0039).

Regarding claim 15, figures 1 and 16 show a transparent cover plate, 5, having a top surface disposed toward incoming radiation and a bottom surface overlying the coating layer, with the diffracted radiation being redirected toward the top surface of the transparent cover and internally reflected (see figure 1).

Regarding claim 18, figure 16 shows the embossing is less than the thickness of the substrate.

Regarding claim 19, JP '031 discloses the repeated pitch having lateral dimensions of 10 or less times the wavelength of light, thus the range includes less than 4000 nanometers. (Paragraph 0022)

Regarding claim 20, figure 1 shows the diffractive pattern extends to cover spaces between the solar cells.

Regarding claim 39, figure 16 shows the use of an adhesive material bonded to the cover member and support structure.

The differences between JP '031 and the claims are the requirements of specific diffractive surfaces and diffracted directions, and that the diffractive pattern specifically eliminate first order diffraction.

Fleming et al teach ways of making diffractive elements that increase efficiency of diffraction in a desired order to levels approaching 100%. (Introduction, 1st paragraph; Single Point Diamond Turning Section; Plunge Cut Diamond Turning Section; Excimer Laser Machining Section) Furthermore, Fleming et al teach a variety of diffractive elements and methods of making. The elements include diffraction grooves and diffractive optical elements such as binary, multilevel, kinoform and hologram.

It would have been obvious to one having ordinary skill in the art to use one of the techniques taught by Fleming as increasing diffractive efficiency to levels approaching 100% to form the diffractive structures of the JP '031 patent, because Fleming teaches the relatively high diffractive efficiencies attainable, and one having ordinary skill in the art would have had a reasonable expectation that higher efficiency

will lead to a greater proportion of incident radiation being directed in the desired manner. Since the efficiencies described by Fleming correspond to "the proportion of incident light that is directed into the desired order" (Introduction), and the efficiencies approach 100%, and JP '031 desires to use 2nd order diffraction (Paragraph 0050), such efficiencies will substantially eliminate redirection of incident radiation in the first order and zero order, among other orders.

It would further have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the variety of different diffractive elements as in Fleming et al. as the diffractive surface of JP '031 because the different types are functional equivalents that Fleming et al. shows are known in the art at the time of the invention. Absent any unexpected results it would be obvious to choose a specific type. Further, the choice of diffracted directions is dependent on the type of diffraction surface and specific application. It would have been further obvious to one having ordinary skill in the art at the time the invention was made to choose the specific amount of directions and the angle between the directions. Because Fleming et al. and JP '031 are concerned with diffractive elements, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

15. Claims 11, 12, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '031 and Fleming et al as applied to claims 1-10, 13, 15, 17-33, and 39 above, and further in view of Tuttle et al. (U.S.P.G.Pub 2005/0074915).



JP '031 in view of Fleming et al is relied upon for the reasons given above in addressing claims 1-10, 13, 15, 17-33, and 39.

The difference between JP '031 in view of Fleming et al and the claims is the requirement of a specific insulation layer.

Tuttle teaches a thin film solar cell as shown in figure 3. The solar cell is insulated from a metal layer by the use of silicon oxide or aluminum oxide (paragraph 0023).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize silicon oxide or aluminum oxide as in Tuttle for the insulation layer of JP '031 because the materials are known insulators for preventing the shorting of solar cells with a metal film layer as shown by Tuttle. Because Tuttle and JP '031 are both concerned with solar cells, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

16. Claims 14 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '031 and Fleming et al as applied to claims 1-10, 13, 15, 17-33, and 39 above, and further in view of Taketoshi et al. (U.S. 4,451,241)

JP '031 in view of Fleming et al is relied upon for the reasons given above in addressing claims 1-10, 13, 15, 17-33, and 39.

The difference between JP '031 in view of Fleming et al and the claims is the requirement of a specific insulation layer.

Taketoshi teaches the use of insulation material such as silicon oxide of magnesium fluoride on a metal layer (column 5, paragraph 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize magnesium fluoride as in Taketoshi for the insulation layer of JP '031 because it is a known insulator to protect metal layers. Absent any unexpected results, it would be obvious to choose the specific insulator such as magnesium fluoride. Note that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

17. Claims 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '031 and Fleming et al as applied to claims 1-10, 13, 15, 17-33, and 39 above, and further in view of Takada et al. (U.S.P.G.Pub 2002/0063962).

JP '031 in view of Fleming et al is relied upon for the reasons given above in addressing claims 1-10, 13, 15, 17-33, and 39.

The difference between JP '031 in view of Fleming et al and the claims is the requirement of a specific coating layer.

Takada teaches the use of dielectric coatings on diffractive optical elements to provide improved reflectance, including multilayer dielectric coatings (abstract; Paragraph 0054).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the dielectric coatings of Takada as the coating layer of JP

'031 because the dielectric coatings improve the wavelength selectivity of the diffraction grating and can also improve the polarization selectivity (Takada paragraph 0009).

Because Takada and JP '031 are both concerned with diffractive surfaces, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

### ***Response to Arguments***

18. Applicant's arguments filed 20 June 2007 have been fully considered but they are not persuasive.

The Examiner thanks Applicant for the provided English translation of JP '031. In addition, the Examiner agrees with Applicant in that it appears the Japanese term corresponding to "order" has been translated as "dimension" throughout the translation. This has been verified by oral translation from a Japanese translator.

Applicant argues that JP '031 does not disclose any structure capable of substantial elimination of the first order diffraction. The Examiner agrees that JP '031 does not explicitly disclose this limitation, but points out that the document does indicate that second order diffraction is selected with respect to the shortest wavelengths of sunlight (Paragraph 0050), and that use of highly efficient diffractive structures, as taught by Fleming et al will lead to substantial elimination of other orders of diffraction, at least insofar as these particular wavelengths are concerned. The limitations of the claim are thus met by the combination.

***Conclusion***

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. As cited in the section 6 above, the "Diffraction Grating Handbook" describes the conventional meanings of "zero order" and other orders of diffraction.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB  
6 June 2008

/Alex Noguerola/  
Primary Examiner, Art Unit 1795